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SCIENCE

FRIDAY, FEBRUARY 17, 1888.

FOR MONTHS PAST the attention of university men throughout the country has been centred in the Princeton College Board of Trustees, who were deliberating as to the successor of Dr. M'Cosh in the presidency of that institution. On Thursday, Feb. 9, the fruit of those deliberations was seen in the unanimous election of Francis L. Patton, D.D., to the vacant post. This choice is on all grounds to be warmly commended. Dr. Patton is still a young man, being but forty-five years of age, and has yet to put forth to their fullest extent his marvellous intellectual powers. We seriously question whether any college has a president of so high an intellectual stamp as Dr. Patton. His theological and philosophical learning is vast in extent, and rich in quality. Both with tongue and pen he is clear and incisive. His critical ability is unrivalled, and in his new position he will have ample opportunity to show whether or not he is equally strong in constructive and administrative power. To follow Dr. M'Cosh is a trying test for any one, but we feel sure that Dr. Patton will confer honor and credit both upon Princeton and upon himself in his administration. That it may be long and prosperous, and that Dr. M'Cosh may long be spared to witness the carrying-on of the work that he has so wisely planned, is the hearty wish of every friend of higher education in this country.

SCIENCE IN ELEMENTARY SCHOOLS.

IN the report of the council of education (England and Wales) for 1887, there are some excellent remarks about elementary science-teaching which are reproduced in a recent number of *Nature*. The judgment is passed that nothing could be more unsatisfactory than the present position of the knowledge and teaching of science in the elementary schools. Notwithstanding all the advantages that have been offered pupil-teachers for the study of science, as a body they appear to be in a most deplorable state in this respect. The inspector who reports on training-colleges finds the ordinary pupil-teacher deficient even in mathematics. It is in doubt whether this deficiency should be ascribed to poor teaching or defective early training. Mr. Fitch, who reports on female training-colleges, finds things no better there. At the admission examination the work in the arithmetic is satisfactory in point of accuracy, but it displays want of method, failure to appreciate the meaning of the question asked, and ignorance of principles. Thus very few of the candidates were able to give an intelligent explanation of simple arithmetical processes, such as subtraction or division. With them, as with the male pupil-teachers, book-work and memory are wholly relied on, and little attention is paid to the intelligent application of principles. "Scarcely three per cent are able to do much more in the teaching of arithmetic than work sums more or less correctly on the blackboard."

With such material to work on, it is not surprising that the results of the work at the colleges are not what they otherwise might be. Those who are below the average at admission rarely succeed very well in the array of subjects to be learned in two years' training. With regard to the male students, the reports at the close of the first year's training record that the answering of the questions set on the first book of Euclid was disappointing. The students appear to have learned their propositions by rote, and to have displayed great want of neatness and accuracy. Though the riders were joined to the propositions on which their solution depended and though all these riders were easy, very few of the papers were satisfactory. This inability to solve the easiest geometrical deductions is commented on again and again, and proves beyond doubt

that either the students are negligently taught, or that they commit the book-work to memory without understanding it, and consequently are quite incapable of applying their knowledge to solve the simplest riders.

In summing up his impressions of the male training-colleges, the inspector gives it as his opinion that the students are over-lectured at some of the colleges, and that the lectures are mechanically reproduced, and transferred as closely as possible to the examination papers. This, of course, is due to the defective early training of the students, and to lectures injudiciously delivered on subjects about which students know absolutely nothing. For instance: one lecturer delivered a very excellent discourse on the corrupt form of Latin used by the Roman soldiers in Britain, its causes and its effects, to a class of which few, if any, of the members knew any thing whatever of Latin.

In the female colleges, even in arithmetic, questions on theory and principles are not well done, long problems are inaccurately done, and, as a whole, it is seen that there is yet much that remains before it can be said that the present system is satisfactory as regards the knowledge given and the methods adopted. There appears to be among the students a very narrow view of their future work, a desire to regard the obtaining of their certificates as the goal and aim of their existence. The views on science, of one of these maidens, are worth recording: "If I am successful in obtaining my certificate, I intend (D.V.) going in for two sciences. At the same time I propose attending a tonic-sol-fa class to get my advanced certificate. Should the two sciences 'sound, light, and heat,' and 'electricity and magnetism,' prove a success, I shall probably take up the science of hygiene." If the training-colleges tend to remove the impression that the technical qualification is the end of the pupil-teacher's work, if they awaken a spirit of emulation among the students, and enable them to teach more thoroughly and intelligently, then they will have fulfilled a large portion of their duties.

With such products as are thus indicated, as teachers, it is easy to predict what the schools that are under their care will be like. With masters, the majority of whom know little or nothing of even the elements of science, the pupils cannot be expected to pass well in these subjects. Thus it is seen, in the return of the number of pupils sent up on 'specific subjects' (most of which are scientific), that only 16.51 of those eligible for examination have been so examined, and of these nearly one-half were from the London School Board District. One-half of the passes were in algebra and animal physiology.

The inspectors in all parts of the Kingdom agree, that, with the exception of some of the cities and large towns, throughout the elementary schools science is untaught. This we can well imagine, when we have seen that the average teacher is completely ignorant of any of its branches, and it is the average teacher who is sent to the country schools. The explanation of some of the inspectors, that in the country for a great portion of the year the attendance of the children who are fit to be taught these subjects is very irregular, does not meet the question; for, even were the children most regular in their attendance, the subjects could not at present be taught, and, until the average elementary teacher is altered, they will not be taught.

The brightest spot of all appears to be Nottingham, and there 2,526 children were examined in specific subjects, of whom four-fifths passed. "Mechanics for boys, and domestic economy for girls, are the subjects principally taken by the Nottingham Board Schools, and are taught by a specially qualified science demonstrator and assistant, who visit the various schools in turns, bringing the apparatus with them in a specially constructed hand-cart. The lectures given on these occasions are afterwards gone through again by the teachers of the schools, from notes taken at the time. These lectures are simple and interesting, and are given with great

care and skill. The results are remarkably good, both as regards the actual knowledge acquired by the scholars, and the stimulus given to the general intelligence. Besides the above-named subjects, physiology and algebra are often taken with very good results, and in one school the principles of agriculture are taught with marked success."

Some of the causes of this almost total absence of any scientific teaching in the elementary schools have been pointed out. Where science has been well taught, it has borne good fruit; and where teachers and managers have set themselves steadfastly to overcome the difficulties in their way, a high and encouraging measure of success has been obtained. Thus we have the remarkable testimony of the success of the experiment in Nottingham, and surely there are many other districts in England quite as competent to carry on this work as Nottingham. Why it could not be done in any town in England, it is difficult to see. In many cases where these subjects have been taught, the inspectors have wisely set their faces against them, finding but a wretched smattering among the pupils. Nothing else can be expected in remote rural districts, where the teacher, whose whole time is scarcely sufficient for the few rudimentary subjects, is so ambitious as to attempt to cram some of his pupils with the elementary knowledge of a science of which he is himself confessedly ignorant. But in the towns and cities competent teachers are always to be had. If the board masters do not find themselves fit for the extra labor and extra knowledge required, there should be no difficulty in obtaining a specialist, as has been done at Nottingham. And in no place could the foundations of technical education be more surely laid than among the elder children of elementary schools. In the minutes and instructions issued to her Majesty's inspectors, managers are requested to aid, in every way they can, the teaching of one or more specific subjects appropriate to the industrial or other needs of the locality, and the rudiments of two higher subjects to supply a foundation for future work. With this object, it is suggested that where the teacher is not competent to do so, — and this, according to the reports, is the rule, and not the exception, — a specialist might be employed by a number of schools in a district, whose instruction would be supplemented by that of the ordinary teachers. There is only one instance, that of Nottingham, given in the reports, of such suggestions having been followed.

What is said in the report about geography and geography-teaching is of special interest. It appears that while there is a great absence of culture and general intelligence upon the part of a considerable number of candidates, yet the answers to the geography-papers set for admission to the male training-colleges are more accurate than would be supposed.

Here, again, the metropolitan candidates are superior to the provincial candidates, particularly in the map-drawing, though in this particular there has been a falling-away of late. Among the female candidates, the geography was not very satisfactory, exhibiting inaccuracies in map-drawing, indefiniteness in the answers, and generally marks of defective early training. In the examinations for the first year's certificates the male candidates answered fully and accurately; but usually there was a slavish following of the words of the text-books and the lecturers' notes. At the end of the second year there is the same report, — book-knowledge without intelligence, and abundance of information imperfectly digested. With the females the result is the same, — verbatim reproduction of the books or notes they had read; fairly creditable answering; but "the style of the papers reveals the painful poverty of the general reading of the students, and the utter absence of any individuality, or attempt at description in their own words." In many papers there was a constant iteration of the same words and phrases, suggesting that the candidates had learned off by rote the answers to probable questions. With regard to the elementary schools, all the reports agree in saying that there has been a marked improvement in the teaching of geography. Where it is intelligently taught, it is the favorite subject; but too frequently the children are not well grounded. While all parts of the country report progress in geography, it is worthy of remark that all the maritime districts surpass the inland schools in the knowledge of the country, its colonies, and its trade. The report believes that this is only natural, and insists that "the teacher who would not, in Devonshire, interest a class of

boys in the voyages of Drake, or who, in Somerset, would not rivet the attention of his pupils on the victories of Blake, would not be worthy of his post." Though the teachers may be congratulated, speaking generally, on the progress made in geography, there are many faults to be found. In portions of Wales and of the centre of England, geography is only fairly satisfactory. The pupils are weak in questions of latitude and longitude: they do not learn intelligently, because most probably they are taught mechanically and unintelligently. It should be within the power of every teacher, by the use of an ordinary globe, to make this portion of the subject intelligible to any ordinary boy. But few lads could understand a lesson on meridians and parallels, given by a teacher who does not use a globe at all; and yet this is quite common. Hence it is that the map-drawing is very poor, even where there is a good knowledge of geographical facts. Many of the inspectors complain of lack of globes, maps, etc.; and, even where there is abundance of general maps, there are no local maps, — a want which is very widely felt. In this respect the Board of Education might take a lesson from the commissioners of national education in Ireland, who have published local maps, and require each pupil in the higher grades to know, in addition to general geography, the map of his neighborhood.

THE IMPROVEMENT OF HARBOR ENTRANCES.

IN 1743, under the direction of Dr. Benjamin Franklin, a movement was started in Philadelphia for the organization of the first scientific society in America; and in a letter from Franklin, under date April 5, 1744, to his friend "Hone Cadwallader Colden, Esq.," he says, "The Society, as far as relates to Philadelphia, is actually formed, and has had several Meetings to mutual Satisfaction; — as soon as I get home, I shall send you a short Acct. of what has been done and proposed at these meetings."

This society, which for nearly a century and a half has been known as the 'American Philosophical Society for the Promotion of Useful Knowledge,' has been presided over by the most distinguished of American scientists and scholars, and an election to its membership has been an honor cherished no less by foreigners than by Americans. The society to-day is venerated for its age, distinguished for its services in promoting useful knowledge throughout the continent, and claims for its supporters the greatest scientists, the most cultured scholars, and the most prominent of American engineers who have been active in the dissemination of useful knowledge through improved navigation, the creation of canal and railway systems, the telegraph, and the development of the mechanic arts, by which useful knowledge has become as free to all as the air we breathe.

In 1785 John Hyacinth de Magellan of London, recognizing the prominent position of the society, proposed to donate to the society "200 guineas, to be appropriated as a perpetual Fund; the interest of which to be annually given, in a medal of gold, as a Premium to the author of the best Discovery, or most useful Improvements relating to Navigation or Natural Philosophy." The conditions under which this premium was to be awarded were drafted by a committee of which Dr. Franklin was a member, and were approved by Magellan himself. These conditions are so exacting that but few discoveries have been considered sufficiently important in themselves to merit the high honor of the 'Magellanic Medal,' — an American honor which is esteemed more highly than any to be won by a scientific discoverer in the field of navigation, natural philosophy, or astronomy; which latter subject Magellan subsequently included. It has now been many years since any discoverer has received this medal, although applications are continually presented which seek the prize so zealously guarded by the society.

Last spring a paper was presented to the society, describing a most important discovery in ocean dynamics, under the title 'The Physical Phenomena of Harbor Entrances, their Causes and Remedies. — Defects of Present Methods of Improvements.' This, with other communications, was referred to the consideration of the twelve counsellors and other officers of the society, and on Dec. 16 a favorable report on the discovery was made to the society, and, by a secret ballot of the members, the premium was awarded the same. Upon opening the sealed letter with the same motto as that accompanying the description of the discovery, it was found that